NHL-KEN-26A

CN 87205995 U

A TOOL USED IN TURNING METHOD FOR MANUFACTURING THREAD GAUGES, SMOOTHNESS GAUGES AND SHAPED SURFACES

The invention relates to a tool used in turning method for manufacturing thread gauges, smoothness gauges and shaped surfaces which can be used in common lathes, precision lathes digital control lathes or copying lathes through hot-pressed ceramel cutting blades to process thread gauges, smoothness gauges and parts with shaped surface mode by several metals of a processing hardness HRC38-68. The processing precision may attain grade 6 in GB (originally, grade 2) with a surface roughness of Ra 0.4-0.2 (a finish ness ≥V8) which results in the turning process being able to substitute for both the grinding and lapping as well as to improve the productivity and the economic efficiency.

As well known, the thread gauge and the smoothness gauge are important integrated checking device in the machinery industry for insuring holes, shafts and parts with thread to have interchangeability. The speedily developed production needs to manufacture various threads and smoothness gauges of high quality to meet the increasing requirements in manufacturing new products. However, the traditional manufacture method for thread gauges in the gauge industry is as follows: rough turning-heat treatment-grinding threads-lapping, which requires not only the expensive external and internal thread grinders but also a relative long processing time. In general, the middle or small machine works cannot manufacture thread gauges for lack of special purpose thread grinder. The common thread grinder in general can only grind the triangle thread gauge and is hardly to process the square toothed trapezoidal thread gauge, the square toothed trapezoidal taper gauge or the gauges of larger diameter (such as those above M120). Moreover, the grinding process is hardly to be applied to the quenching hordened parts of

complex shaped surface since a low efficiency and a high cost and is even impossible to process these parts frequently. The material of common turning tool employs in general the carbon tool steel or the high speed steel since the former has a temperature resistance below 250-300℃ and the later has a temperature resistance below 500-600℃. The material of tool is also hardly to complish the task for precisely turning high strength materials hence is not suitably to turn the thread gauge and the smoothness gauge.

The invention is directed to solve the technical problems existed internally and externally in the process method and the common tooling cool for processing the thread gauge, the smoothness gauge and the shaped surface. The object of the invention is to provide a solution which allows to employ the precision lathe, the copying lathe and the digital control lathe possessed by common factories to utilize the turning technology of higher efficiency in substituting for the thread grinder so that it is possible in the light of local conditions to speedily and conveniently processing the thread gauge, the smoothness gauge and the shaped surface.

The aim is attained through the following means:

According to the invention, a set of tools for precisely turning gauges or shaped surface of high strength material includes a blade 1, a clawping plate 2, a fastening screw 3 and a movable tool holder 4. Based on the different materials and different parts to be processed such as to process excircles, internal holes, conical or other shaped surfaces, common metric or English threads, metric or English taper threads, square toothed threads, trapezoidal threads and zigzag taper threads, the structure and material of the tool may be some different. Thus, a set of precisely turned tools of high strength material is designed for meeting the requirement of the above-mentioned processing tasks.

Based on the material of workpiece, especially on the hardness and the strength of material, the material of the blade 1 can select the hard alloy or the

hot pressed ceramel material. The common hard alloy tool may have a hardness of HRC 87-91, a heat-resistance of 850-1000℃, a cutting speed of 4-10 times than that of the high-speed steel. As for the general high strength workpiece material, the H6600 or 726 high alloy blade can be selected with a surface hardness of HRC 55-58 for the processed parts, and for the high strength hardened steel, modified steel, high-manganese steel and super hard cast iron materials, the blade 1 mode of the type AT6 hot-pressed cermel blade can be selected.

The geometric angle of the blade 1 is different dependent on the work piece material and the processing requirement and in general the hard alloy or ceramic blade has a larger brittleness so it employs a forward angle of a negative or a very small degree, for example, for the contour excircle ceramic blade the forward angle takes a value of -3°. The hard alloy or ceramic blade though has a large brittleness and a bad tensile strength get has a good pressure resistance, thus when the blade 1 has a positive forward angle the nose bears a tension and when the blade has a auxiliary forward angle, the nose bears a pressure, therefore, the blade has a large rigidity and a large cross section and is beneficial to heat-transfer. The main back angle is selected as 3° to insure the tool to be rotated freely in cutting to reduce friction and to improve the surface smoothness. The end relief angle a1 is selected as 8° with the same object to insure the tool to be rotated freely in cutting to reduce friction and improve the surface smoothness. The tilt angle of the edge is selected as 9° which is different from the common turning tool. In general, the positive tilt angle of edge is only used in the planning tool and this is based on the consideration that the hard alloy or ceramic blade has a larger brittleness and a low tension resistance however the positive tilt angle of edge is beneficial to improve the strength and rigidity of the blade hence to improve the endurance of the blade. The radius R of the nose is selected as 0.5mm and in general as about 2mm. The larger the radius R is and the higher

the cutting speed will be which will bring the blade a good heat-transfer thus the temperature during a cutting operation may be somewhat lower. It should be noted that the hard alloy or ceramic blade has a good temperature resistance, for example the ceramic blade can still work normally up to 1200℃ and the hardness of the blade may reach HRC 93-96, therefore in spite of the blade being worn during its working and the radius of the nose become larger the blade can be continuously used in cutting operation. The blank size of the blade 1 is 13×13×8(mm).

The blade 1 is screwed firmly on the tool holder 4 through the screw 3 by means of clamping plate 2 which is convenient usually to remove the blade 1 for edge grinding or change. The holder 4 and the screw 3 may be used repeatedly many times thus saving the holder and clamping plate. The tool holder 4 with the blade 1 on it may be fixed on a tool carriage of a lathe which may increase the efficiency of work over 5 times.

In turning an inner hole and an excircle of CrMnNo and ZGHuB with quenching engine's piston pin of 12 CrNi3A with a carburized hardness HRC62 and a bearing inner race of GCr 15 with a quenching hardness HRC62-64, the set of turning tools all exhibits a good cutting effect and has improved the endurance ten times over than that of the optimal hard alloy blade. Therefore, some parts which should be fine turning after quenching but cannot be ground through a grinder or which have missed certain steps before the quenching that ought to be supplemented after the quenching can adopt the set of turning tool to carry out all necessary processes and remedying processes after quenching.

According to the invention, the tool can be used in a common precision lathe to turn the threaded parts which creates a distinguished technology, simplifies the apparatus and is flexible in technique and convenient to operate. Moreover, by means of these tools, a variety of threads can be processed with a high productivity. It has application in a broad field and obtains a unique

economical efficiency. These tools have been reliably to process the common metric or English threads, the metric or English taper threads, the square toothed threads, the trapezoidal threads, the zigzag threads and the trapezoidal, zigzag taper thread gauges or high precision threaded parts with the following specifications:

external thread gauge: M10-M200mm, pitch 0.5-8mm

internal thread gauge: M20-M180mm, pitch 0.5-3mm

square toothed, trapezoidal external thread gauges:M10-M200mm, pitch 0.5-8mm

internal square toothed, trapezoidal threads gauges: M30-M200mm, pitch 0.5-8mm.

The precision of the above thread gauges can attain grade 6 in GB (originally, grade 2 GB) with a surface roughness of Ra 0.4-0.2 (originally a finishness ≥ V8).

The main advantages of the invention is as follows:

1. Adopting the tool of the invention, one can manufacture various precise parts by the common precision lathe with the effect to substitute the turning operation for the grinding operation hence increasing the productivity and reducing the production cost;

2. The tool of the invention adopts a hard alloy or cermel blade and the blade has a high endurance so that one such a blade may be suitable to process many kinds of parts;

3. The tool according to the invention in addition to process the parts of common materials is particularly suitable to process the high strength, high hardness quenching steel, modified steel, high manganese steel and high hardness chilled cast iron;

4. The tool according to the invention has a high precision and a good finishness, when the tool is used to turn a thread gauge in a common precision lathe with a lead screw of precision grade 1, the production precision may

attain precision grade 2 in GB and a finishness ≥ V8.

5. The related apparatus is simple and the technique is flexible meanwhile it is convenient to operate. For example, it is easy to mount and clamp the tool and workpeice on a common precision lathe. To finely turn one thread gauge requires only 20 minutes. The product percent of pass is high ingeneral higher than 98%.

Fig.1 and Fig.2 shows two embodiments of the invention.

Fig.1 is a diagram of an excircle cutting turning tool according to the invention.

Fig.2 is a diagram of an internal threading tool according to the invention.

An embodiment of the contour excircle cutting turning tool according to the invention is as follows.

A hot-pressed AL203-TiC cermel blade and the material of the blade is AT6 with a size length×width×thickness=13×13×8(mm). The structure is a top pressed mechanical clamping left partial force with a geometric angle: main deflection angle 45°, forward angle -3°, main back angle 3°, main end relief angle 8°, edge tilt angle 9°, radius of nose 0.5, negative chamfer 0.1×30°.

An embodiment of the internal threading tool according to the invention.

A hot-pressed cermel blade and the material of the blade is also AT6 with a size 16×16×4.5(mm) (half of the standard blade). The stracture is a mechanical clamping internal thread cutting turning tool, with geometric angles: forward angle 0°, main back angle about 3°-5°, end relief angle 2°-3°, nose angle relative to the metric thread 60°±9′.

What is Claims is:

1. A tool used in turning method for manufacturing gauges and shaped surfaces characterized in that the shape, structure, geometric parameter of the tool are different dependent on different materials and different parts, in general, the blade (1) of the tool having a negative forward angle or the value of the forward angle being very small, for a contour excircle blade, the forward angle r being -3°, the main back angle a being 3°, the negative back angle a1 being 8°, the edge tilt angle being 9° and the radius of the nose being about 0.5mm; for a threading tool, the forward being about 0°, the main back angle being about 3°-5°, the end relief angle being about 2°-3° and the nose angle for the metric thread being 60°±9′.

2. The tool used in turning method for manufacturing gauges and shaped surfaces according to claim 1, characterized in that the material of the blade (1) being a hard alloy, a ceramal material or the material having a composition approximating the ceramic material.

3. The tool used in turning method for manufacturing gauges and shaped surfaces according to claim 1, characterized in that when the blade (1) adopts a hard alloy material its model number is H6, 600 or 726; when the blade (1) adopts a ceramic material, its model number is AT6 hot-pressed cermel material or the material having a composition approximating the AT6 hot-pressed cermel material.

ABSTRACT

The utility model relates to a tool used in turning method for manufacturing thread gauges and shaped surfaces. It can be used in common lathes, precision lathes, digital control lathes or copying lathes through hard alloy blades or hot-pressed cermel blade to process and the processing precision may attain grade 6 in GB (originally, grade 2) and a finishness Ra 0.4-0.2 (originally, a finishness ≥ V8) with the effect to substitute the turning operation for the grinding operation and to simplify the related apparatus as well as to improve the efficiency of both production and economy. The new designed tool includes the blade (1), the clamping plate (2), the fastening screw (3) and the movable tool holder (4).